

## **SECTION IV: CONSERVATION ISSUES AND ACTIONS**

An issue is any unresolved conflict that has the potential to affect the biological, ecological, social, or economic environment, including wildlife and habitats. This section describes relevant issues. Conservation actions that address each issue include measures or “tools” to resolve or minimize conflicts and meet objectives for sage-grouse habitats and populations. Conservation actions that appear in this section establish a framework for making decisions and offer a range of options to address specific issues.

As noted in the previous portions of this plan North Dakota has a relatively small population of sage-grouse occupying only a small portion of the State. These issues and actions are consequently not meant to be broadly applied throughout the range of the sage-grouse but on a local basis when conditions warrant such actions to conserve either numbers or habitat. Not all of these issues are currently relevant to sage-grouse in North Dakota, however, they do affect sage-grouse in other states and are included in this discussion to provide land managers, and others, with the information needed to resolve or minimize conflicts associated with each should the need arise.

Issues considered to be of current or future importance to sage-grouse in North Dakota are: fire; harvest management; livestock grazing management; mining and energy development; noxious weed management; outreach, education, and implementation; power lines and generation facilities; predation; recreational disturbance of sage-grouse; roads and motorized vehicles; vegetation; and other wildlife.

### **Fire Management**

Fire has always been present in sagebrush communities. Benefits and detriments to sage-grouse habitats and relative frequency of fire often are subjects of disagreement. Fire has been a factor in the loss of mature sagebrush habitat and affects sagebrush communities differently depending on the species of sagebrush. Fire management actions are divided into two categories; suppression of wildfires, and prescribed fire. Both wild and prescribed fires can have cumulative effects on sagebrush habitat and species that depend on it.

Prescribed fires are planned events with specific objectives; however, changes and variation in conditions at the site can change the actual outcome. Use of prescribed fire in the sagebrush community will result in a net loss of sagebrush and is of concern to those desiring to maintain a mature sagebrush community and associated wildlife.

Wildfires are less predictable and unplanned, and they have the most significant effect in the densest sagebrush. Suppression actions serve to protect sagebrush communities, human life, and community protection.

How can we minimize impacts of wildfire or prescribed fire on sage-grouse habitat?		
Goal	Issue	Conservation Actions
Manage prescribed fire in big sagebrush habitats to result in no net loss.	Reduction of sagebrush by prescribed fire.	<ol style="list-style-type: none"> <li>1) Sites should not be burned unless: <ol style="list-style-type: none"> <li>a) biological and physical limitations of the site are identified and clearly understood and any impacts on sage-grouse are identified and considered, including sagebrush recovery time.</li> <li>b) wildlife and range management objectives for the site are clearly defined and understood.</li> <li>c) post burn habitat management objectives are defined along with monitoring capabilities as well as funding to implement post burn management. Manage grazing, reseeding or other activities that influence the outcome of rehabilitation in a manner that achieves the desired future condition of the burned site.</li> </ol> </li> </ol>
Manage wildfire in sagebrush habitats to result in no net loss.	Reduction of sagebrush by wildfire.	<ol style="list-style-type: none"> <li>1) Schedule annual coordination meetings—with appropriate resource staff including fire specialists, wildlife biologists, range ecologists, and local fire suppression personnel—to incorporate new sage-grouse habitat and other wildlife habitat information needed to set wildfire suppression priorities related to resources. Distribute updates to fire dispatchers for initial attack planning.</li> <li>2) Incorporate known sage-grouse habitat information into each Wildfire Situation Analysis to help determine appropriate suppression plans and prioritize multiple fires.</li> <li>3) Retain unburned areas of sage-grouse habitat, e.g., interior islands and patches between roads and fire perimeter, unless compelling safety, resource protection, or control objectives are at risk.</li> </ol>
	Rehabilitation and restoration of sagebrush-grasslands.	<ol style="list-style-type: none"> <li>1) Assure that long-term wildfire rehabilitation objectives are consistent with the desired natural plant community.</li> <li>2) Re-vegetate burned sites in sage-grouse habitat within one year. Areas disturbed by heavy equipment will be given priority consideration.</li> <li>3) Emphasize native plant species adapted to the site that are readily available and economically and biologically feasible.</li> <li>4) Monitor the site and treat for noxious weeds.</li> <li>5) Allow a minimum of two growing seasons of rest from grazing by domestic livestock unless there are specific restoration objectives using livestock.</li> </ol>

	Proactive treatments that could reduce the risk of loss of habitat critical to sage-grouse.	<ol style="list-style-type: none"> <li>1) Develop criteria for managing fuels and other risks to sage-grouse habitat.</li> <li>2) Identify critical sage-grouse habitats and prioritize on the basis of risk of loss to wildfire.</li> <li>3) Develop appropriate actions on a site by site basis, e.g., using existing roads as fire breaks.</li> </ol>
--	---	--

## Harvest Management

Hunting is a direct form of mortality to sage-grouse but is compatible with healthy sage-grouse populations although some do think that “surplus birds” should not be removed from what they see as a species “at risk.”

Sage-grouse abundance is affected by long- and short-term population changes. Long-term population declines have been related to loss of sagebrush habitats essential to sage-grouse (Connelly et al. 2000a). Although not irreversible in nature, conditions resulting in long-term declines are likely to persist. Within the long-term decline are short-term fluctuations in sage-grouse abundance due to variable climatic events, e.g., drought or severe winters.

Sage-grouse hunting is a recreational and culturally important tradition. Analysis of wings collected from hunters is the best source of information on annual productivity of sage-grouse and the influence of changing climatic conditions on productivity and population composition. Juvenile/adult ratios generated by wing analysis also can indicate approaching changes in male attendance on leks in subsequent years. Lek surveys determine the number of active leks while lek counts determine number of males/lek and are the best source of population trend information.

Sage-grouse exhibit relatively low productivity and high survival when compared with other upland birds. Nevertheless, sage-grouse have significantly declined in North Dakota. Loss of habitat and degradation of existing habitat is believed to be the most significant factors affecting sage grouse in North Dakota. An appropriate harvest rate has not been determined for greater sage-grouse populations but a harvest equal to 5-10% of the autumn population may be appropriate (Connelly et al. 2000b). If habitat becomes more restricted and population trends continue their decline, seasons may be suspended (see Conservation Action 1 below).

How can we maintain sage-grouse hunting without impacting the viability of sage-grouse populations and the public's sage-grouse hunting opportunity?		
Goal	Issue	Conservation Actions
Manage for harvests that respond to changes in sage-grouse populations and maintain or increase sage-grouse populations.	There is a single harvest structure for the entire sage-grouse range in North Dakota.	<ol style="list-style-type: none"> <li>1) Close the sage-grouse season if the spring census indicates there are fewer than 100 males in the population which would indicate the breeding population is less than 300 individuals (Connelly et al. 2000b)</li> <li>2) Establish sage-grouse seasons on an annual basis using the current year's lek data and other appropriate survey data. This would include the development of a statistically reliable trend monitoring protocol for inventorying lek attendance of male sage-grouse.</li> </ol>

	There are strongly opposed viewpoints on the influence of hunting on sage-grouse populations.	1) Develop graduate level studies to evaluate the influence of hunting on sage-grouse and what would constitute a maximum harvest rate. 2) Continue standardized wing collection protocol to evaluate the influence of environmental conditions on sage-grouse productivity and population trends. 3) Expand public information efforts designed to increase public awareness of the role of sage-grouse hunting.
--	---	---

## Livestock Grazing Management

Sagebrush communities provide critical habitat for sage-grouse, produce a diversity of tangible commodities and satisfy many societal values that are important to the U.S. economy and the well-being of U.S. citizens. Sagebrush-dominated rangeland that is occupied by sage-grouse includes private, state and federal lands.

Rangelands in the Northern Great Plains evolved with grazing and extreme climatic disturbances. However, many western rangelands were over-stocked with livestock in the late-1800s and early 1900s, thus altering the composition and productivity of some sagebrush and other vegetative communities. With development and implementation of proper range management practices, vegetation condition of many rangelands has improved (Montana Sage Grouse Work Group 2004).

Sagebrush communities typically have forage value for livestock as well as providing habitat for sage-grouse. Livestock effects on sage-grouse habitat, and on the birds, may be positive, negative, or neutral depending on the specific grazing prescription and on the ecological site. Livestock grazing has been responsible for retaining tracts of sagebrush-dominated rangeland from conversion to cropland. In terms of habitat quality, properly managed grazing can stimulate growth of grasses and forbs, and thus livestock can be used to manipulate the plant community toward a desired condition. For example, rest-rotation grazing systems designed after Hormay (1970) provide for long-term range health and, in comparison to other systems, was found to produce up to four times as many prairie grouse (i.e., sharp-tailed grouse and prairie chickens) compared with other grazing systems on the Fort Pierre National Grasslands (Rice and Carter 1982). Although that study didn't address sage-grouse directly, the effect of improved residual cover, in response to grazing management, would likely have positive implications for sage-grouse habitat. Management may not, however, restore all degraded range through grazing manipulation alone. Likewise, appropriate grazing practices may not totally compensate for other influences affecting sage-grouse abundance.

In response to environmental concerns, livestock operators and other land managers have developed stock water sources on uplands and have constructed fences to shift grazing from riparian to upland areas. Meeting objectives for riparian areas may increase removal of vegetation on upland sites. To minimize the potential impact of removing important understory vegetation, flexible grazing management programs need to be planned and implemented while considering needs of sage-grouse. Land managers also should consider potential effects, such as disturbance or mechanical damage to sagebrush, caused by livestock concentrations near leks during the breeding season or on key winter habitats.

Cooperative research is needed to identify and evaluate effects of various grazing management plans on the interaction of sage-grouse, commodity production, and societal values. Results should be used to develop grazing plans that eliminate or minimize potential conflicts.

Prescribed grazing standards and best management practices as described in *Best Management Practices for Grazing* (Montana Department of Natural Resources and Conservation 1999) are recommended as methods that can be used to implement many of the grazing actions in this section. In addition, the conservation actions in this section describe some considerations that may be specific to sage-grouse and sagebrush habitats.

<b>How can we maintain and enhance sagebrush rangelands to provide productive sage-grouse habitat while providing for commodities and values desired by society?</b>		
<b>Goal</b>	<b>Issue</b>	<b>Conservation Actions</b>
Manage grazing to maintain soil conditions and ecological processes necessary for a properly functioning sagebrush community that addresses the long-term needs of sage-grouse and other sagebrush associated species. <sup>a</sup>  <sup>a</sup> Desired conditions for sage-grouse are covered in Section IV and Attachment I.	Conflicting priorities for land uses, species, and habitats	1) Use scientific data and historic information to establish baseline information when evaluating soil conditions and ecological processes and when monitoring seasonal sage-grouse habitats.  2) Set specific habitat objectives and implement appropriate grazing management to achieve those objectives and maintain or improve vegetation condition and trends.  3) Offer private landowners incentives when and where appropriate to achieve sage-grouse objectives.  4) Utilize techniques as outlined in “Interpreting Indicators of Rangeland Health”, Technical Reference 1734-6.
	Some sagebrush communities may have been significantly altered by past grazing management practices	1) Implement appropriate grazing management strategies and range management practices where soil conditions and ecological processes will support sage-grouse and desired commodities and societal values.  2) Establish suitable goals for sagebrush communities that have deteriorated to such an extent that livestock management alone will not be sufficient to obtain habitat objectives.  3) Offer private landowners incentives when and where appropriate to achieve sage-grouse objectives.
	Drought may result in the degradation of native plant communities, reduces forage production, and thus reduces sage-grouse habitat	1) Livestock managers should have drought management strategies or plans (e.g. water facilities; forage sources) formulated for implementation during periods of drought.  2) Consider effects of livestock and wildlife distribution on sage-grouse prior to developing additional water sources.  3) Offer private landowners incentives when and where appropriate to achieve sage-grouse objectives.

	<p>Improper grazing, or lack of grazing, can change the composition and/or structure of the native plant community and thereby reduce or eliminate food and cover for sage-grouse.</p>	<ol style="list-style-type: none"> <li>1) Monitor the response of forbs (kinds, vigor, and production) and the compositional diversity of native species with respect to livestock grazing, evaluate the data, and make necessary adjustments.</li> <li>2) Identify reasons for lack of grass and forb cover in sagebrush communities and recommend/implement practices to increase the native herbaceous understory.</li> <li>3) Identify critical sage-grouse areas, and adjust grazing to minimize conflict between production of commodities and protection of societal values.</li> <li>4) Use monitoring methods that are best suited to the type of grazing management being incorporated at a site. Note: proper use will vary with the type of grazing system, e.g., rest rotation vs. deferred.</li> <li>5) Adjust stocking levels (up or down) within the carrying capacity of the pasture or range. Adjustments should be based on a monitoring program evaluating plant and soil response with respect to actual livestock use, weather, wildlife use, insects, and other environmental factors.</li> </ol>
	<p>Riparian areas (wet meadows, seeps, streams) are important resources for sage-grouse and livestock.</p>	<ol style="list-style-type: none"> <li>1) Design and implement livestock grazing management practices (riparian pastures, seasonal grazing, development of off-stream water facilities, etc.) to achieve riparian management objectives. This may require additional water developments and/or fencing to achieve objectives. Additional two-track trails may be necessary. Decisions will be made on a case by case basis whether benefits from protection of riparian areas will be offset by additional developments.</li> <li>2) Modify or adapt pipelines and natural springs, where practical, to create small wet meadows as brood habitat.</li> <li>3) Ensure the sustainability of desired soil conditions and ecological processes within upland plant communities following implementation of strategies to protect riparian areas. This can be achieved by: <ol style="list-style-type: none"> <li>a) protecting natural wet meadows and springs from over-use while developing water for livestock,</li> <li>b) planning the location, design, and construction of new fences to minimize impacts on sage-grouse. (See criteria for fencing under Grazing Management)</li> <li>c) avoid heavy utilization of grazed pastures to compensate for rested pastures (a year of rest cannot compensate for a year of excessive use).</li> </ol> </li> </ol>

	Potential for sage-grouse to be disturbed or displaced by concentrations of livestock near leks or winter habitat.	<ol style="list-style-type: none"> <li>1) Discourage concentration of livestock on leks or other key sage-grouse habitats. <ol style="list-style-type: none"> <li>a) Avoid placement of salt or mineral supplements near leks during the breeding season (Mar-Jun),</li> <li>b) Avoid supplemental winter feeding of livestock, where practical, on sage-grouse winter habitat and around leks.</li> <li>c) Offer private landowners incentives when and where appropriate to achieve sage-grouse objectives.</li> </ol> </li> </ol>
	Sage-grouse seasonal ranges encompass private, state, and federal land. Habitat values across the respective ownerships are important to sage-grouse.	<ol style="list-style-type: none"> <li>1) Encourage land management practices that provide for maintaining or enhancing sage-grouse habitat on private, state, and federal land.</li> <li>2) Encourage coordination of management activities on all properties to provide yearlong benefits to sage-grouse. This may require reasonable compromise in establishing management practices to achieve specific goals.</li> <li>3) Offer private landowners incentives when and where appropriate to achieve sage-grouse objectives.</li> </ol>
Assess impacts of fencing for livestock on sage-grouse and sage-grouse habitats.	Existing fences near breeding, brood-rearing, or winter habitats can increase the risk of collision mortalities and/or predation on sage-grouse by hawks, eagles, and ravens by providing perches.	<ol style="list-style-type: none"> <li>1) If portions of existing fences are found to pose a significant threat to sage-grouse as strike sites or raptor perches, mitigate through moving or modifying posts, etc.</li> <li>2) Increase visibility of those fences by flagging.</li> <li>3) Offer private landowners incentives when and where appropriate to achieve sage-grouse objectives.</li> </ol>
	Proposal of new fences near sage-grouse leks and winter ranges.	<ol style="list-style-type: none"> <li>1) Avoid placing fences through or near leks and winter ranges on state and federal lands.</li> <li>2) Similar practices should be considered on private lands where possible.</li> <li>3) Offer private landowners incentives when and where appropriate to achieve sage-grouse objectives.</li> </ol>
Minimize impacts of using pesticides and herbicides to control insects and herbaceous plants that provide a food source for grouse.	Pesticides and herbicides may adversely impact the kinds and number of foods available in the form of insects and forbs and can directly affect chick survival.	<ol style="list-style-type: none"> <li>1) Evaluate ecological consequences of using pesticides to control grasshoppers or other insects.</li> <li>2) Evaluate ecological consequences of broadcast herbicide use on forbs and other important sage-grouse foods.</li> <li>3) Minimize use of pesticides and herbicides within 1 mile of known grouse nesting areas, leks, or brood-rearing areas.</li> <li>4) Develop educational materials detailing effects of pesticides and herbicides on sage-grouse.</li> </ol>

## Mining and Energy Development

Many of the nation's oil and gas resources are located under sage-grouse habitats across the western U.S. Energy activity can negatively affect sage-grouse populations if habitats are lost, fragmented, or changed in ways unfavorable to grouse.

Effects of oil and gas development on sage-grouse are not extensively documented. While exploration and development may negatively affect sage-grouse habitat and populations, long-term impacts after reclamation are not clearly understood. Research suggests that energy development can displace sage-grouse and that displaced grouse may return in some cases to the site after energy-related activities have ceased, but populations may not attain pre-development levels. Declines are attributed to effects of human disturbance, roads and power lines that fragment habitat, placement of infrastructure in areas once free from structures, alteration of vegetation composition through introduction of noxious weeds and other non-native plants, and disruptive noise near leks. Initial site disturbance and remaining structures can potentially enhance habitat for avian and mammalian predators.

Current research in several western states is directed at identifying and quantifying impacts of energy development on sage-grouse.

How can we meet our energy demands and minimize impacts to sage-grouse and sagebrush habitats?		
Goal	Issue	Conservation Actions
Minimize impacts of oil and gas development on sage-grouse and sagebrush habitats.	Energy development may adversely affect sage-grouse.	<ol style="list-style-type: none"> <li>1) Work cooperatively—agencies, utilities, and landowners—to identify and map important seasonal ranges for sage-grouse.</li> <li>2) Complete a broad scale assessment to identify important areas for grouse (wintering, nesting etc.) that require additional protection or conservation during land use planning and leasing of energy reserves.</li> <li>3) Prioritize areas relative to their need for protection—ranging from complete protection through moderate to high levels of energy development.</li> <li>4) Encourage development in incremental stages to stagger disturbance (federal leases range from 3-10 years); design schedules that include long-term strategies to localize disturbance and recovery within established zones over a staggered time frame.</li> <li>5) Provide technical assistance to private landowners who lease privately owned fee minerals.</li> <li>6) Use off-site mitigation, e.g., creation of sagebrush habitat, or purchase conservation easements with industry dollars to offset habitat losses.</li> <li>7) Remove facilities and infrastructure when use is completed.</li> <li>8) Enhance our understanding of effects of energy development through pre-activity inventory,</li> </ol>



		<p>monitoring over the life of the development, and annual evaluations thereafter.</p> <p>9) Encourage operators to utilize conservation efforts on all development projects regardless of surface ownership.</p>
	Increased human disturbance.	<p>1) Allow no surface occupancy within 0.25 miles of an active lek. If siting structures near important breeding, brood-rearing, and winter habitat is unavoidable, consider the following:</p> <ol style="list-style-type: none"> <li>size of the structure(s),</li> <li>life of the operation,</li> <li>extent to which impacts would be minimized by topography, and</li> <li>disturbance by noise and maintenance.</li> </ol> <p>2) Allow no surface use in nesting habitat within 2 miles of an active lek during a period of breeding and nesting—1 March –15 June (this action applies to drilling, testing and new construction projects, but does not apply to operation and maintenance of production facilities).</p> <p>3) Restrict maintenance and related activities in sage-grouse breeding/nesting complexes—1 March –15 June—between the hours of 8:00 pm and 8:00 am</p> <p>4) Allow no surface use activities within crucial sage-grouse wintering areas during 15 November-14 March (this action applies to drilling, testing and new construction projects, but does not apply to operation and maintenance of production facilities).</p> <p>5) Remove structures and associated infrastructure when project is completed.</p>
	Increased roads, pipelines, and power lines can fragment sagebrush habitats.	<p>1) Develop a comprehensive infrastructure plan prior to energy development activities to minimize road densities.</p> <p>2) Avoid locating roads and power lines in crucial sage-grouse breeding, nesting, and wintering areas.</p> <p>3) See conservation actions for siting and constructing power lines.</p> <p>4) Use minimal surface disturbance to install roads and pipelines and reclaim site of abandoned wells to natural communities.</p>

Minimize impacts of fossil fuel generation facilities on sage-grouse and sagebrush habitats.	Energy-related facilities located within 2 miles of a sage-grouse lek can degrade habitat quality.	<ol style="list-style-type: none"> <li>1) Locate storage facilities, generators, and holding tanks outside the line of sight and sound of important breeding habitat.</li> <li>2) Minimize ground disturbance in sagebrush stands with documented use by sage-grouse: <ol style="list-style-type: none"> <li>a) breeding habitat—the lek and associated stands of sagebrush,</li> <li>b) nesting habitat—stands of sagebrush within 2 miles of a lek, and</li> <li>c) wintering habitat—sagebrush stands with documented winter use by sage-grouse with portions that would remain above the snow even during years of deep-snow conditions.</li> </ol> </li> <li>3) Concentrate energy-related facilities when practical.</li> </ol>
	Energy-related activities can cause invasion of noxious weeds and other non-native plants.	<ol style="list-style-type: none"> <li>1) See conservation actions related to preventing the spread of weeds and controlling infestations of noxious weeds.</li> <li>2) Engage industry as a partner to develop and establish new sources of seed of native plant species for restoration of sites disturbed by development.</li> </ol>
	Noise can disrupt breeding rituals and cause abandonment of leks.	<ol style="list-style-type: none"> <li>1) Restrict noise levels from production facilities to 49 decibels (10 dba above background noise at the lek).</li> <li>2) Restrict use of heavy equipment that exceeds 49 decibels within 2 miles of a lek from 8 p.m-8:a.m. during March 1-June 15.</li> <li>3) If possible locate production facilities downwind (prevailing wind direction) of lek sites to further reduce disturbance.</li> </ol>
	Water discharge and impoundments can degrade or inundate breeding, nesting, and winter habitat.	<ol style="list-style-type: none"> <li>1) Design impoundments and manage discharge so as not to degrade or inundate leks, nesting sites, and wintering sites.</li> <li>2) Protect natural springs from any source of disturbance or degradation from energy-related activities.</li> </ol>
Provide for the least obtrusive regulation of oil and gas activities while providing for needs of sage-grouse.	Siting requirements need to be re-examined as technological advances make development more compatible with sage-grouse needs.	<ol style="list-style-type: none"> <li>1) Provide for long-term monitoring of siting requirements to examine effects of current and future development on sage-grouse.</li> <li>2) Set up a schedule for reviewing and revising siting and use criteria with industry.</li> </ol>

## Noxious Weed Management

Certain species of plants are currently designated as “noxious” in North Dakota as well as others that are termed “troublesome” (NDSU Ext. Service 2004). “Noxious” applies only to species so designated by the North Dakota Department of Agriculture. County weed boards may add species to local lists that have not been designated by the state, but at a minimum must include those species designated by the Department of Agriculture. Resource managers, both public and private, have a statutory responsibility to develop management plans for treatment of noxious weeds on the land they own and/or manage. The magnitude of weed infestations, however, often prevents appropriate and timely treatments.

Noxious weeds and other invasive plant species, such as annual grasses, displace more desirable native plant species and cause significant adverse biological and economic effects by reducing productivity of healthy rangeland. Noxious weeds impact all classes of wildlife and domestic livestock. Plant species designated as noxious weeds are classified as either established and spreading, newly introduced, or are recognized as potential invaders. Noxious weed species present in adjoining states and provinces are a threat in North Dakota.

Although introduction and subsequent spread of weeds can occur through several means, the most pervasive occurs along transportation and floodplain corridors. One of the primary concerns of resource managers is the spread of noxious weeds by vehicles. Disturbed ground typically serves as the initial point of establishment, with the amount of disturbed ground being directly proportional to the overall susceptibility of an area to weed invasion.

Disturbance can take many forms and causes—the most common being human-caused activities, such as road building. Often overlooked, but equally important, are climatological and biological influences. Recurrent flooding and wildfires, as well as prolonged drought, can disturb plants and topsoil over large areas. Biological forms of ground disturbance include burrowing activities by small mammals and localized over-use by livestock and/or wild ungulates. These large- and small-scale disturbances provide opportunity for invasive species to become established.

Herbicide treatment is the most widely employed method to control noxious weeds. For most noxious weeds, this method of treatment provides immediate, effective results. Problems occur when weed seeds have been allowed to build up in the soil and/or surrounding land areas and left untreated. Re-establishment in such cases occurs from seed banks and off-site reinvasion. This cycle of treatment/re-establishment is expensive and requires dedication and immediate action by resource managers when weeds reappear within treated areas. Prevention, which requires focused purposeful action in surrounding infested and uninfested areas, provides the most cost-effective control. Prevention works best when management strategies acknowledge a threat and prioritize efforts to eliminate potential sources of infestation and expansion.

Chemical control of noxious weeds is efficient but might pose some toxicological risk to sage-grouse and other wildlife during treatment. Pathways of exposure include absorption from treated plants, inhalation of chemical particles suspended in the atmosphere, and direct ingestion of treated plants (Montana Fish, Wildlife and Parks 1994). If properly applied, however, toxicological risks should be minimal. A reduction of forbs important to sage-grouse during brood-rearing could have more serious consequences to local populations, with the magnitude of effects dependent on the scale of treatment. However, resource managers must realize that untreated noxious weeds are ultimately more effective at competitively displacing desirable plant components than short-term, transient impacts from proper herbicide application.

<b>How can we minimize impacts of noxious weeds and other invasive species and their control on sage-grouse?</b>		
<b>Goal</b>	<b>Issue</b>	<b>Conservation Actions</b>
Identify current noxious weed infestations within and adjacent to occupied sage-grouse habitat or suspected ranges.	Current information on existing weed infestations is insufficient for successful weed management.	1) Inventory and map existing noxious weed populations within and adjacent to occupied sage-grouse habitat or suspected range.
Implement habitat-specific weed management plans for known sage-grouse ranges.	Appropriate weed management can't be performed without habitat-specific information.	1) Develop habitat-specific weed management plans for known sage-grouse ranges, using the inventory and map information developed in the action described above.
Maintain habitat quality for both wildlife and livestock interests through proactive weed management.	Weed infestations result in loss of native grass, forb, and sagebrush abundance and diversity.	1) Promote measures that prevent introduction and spread of weed seeds and other reproducing plant parts.
Prevent the initial establishment of weeds within or on lands surrounding sage-grouse habitat.	Noxious weeds spread quickly and without regard to ownership or management boundaries. Without immediate treatment, noxious weeds become a problem to all surrounding landowners. Effective weed management cannot occur in isolation or to the exclusion of any land managers within an area.	1) Develop and implement management techniques that minimize the risk of infestation. 2) Use weed seed-free livestock forage and mulch. 3) Where feasible, avoid vehicle movement through infested areas. 4) Use weed-free seed for re-establishment of vegetation. 5) Eliminate unnecessary soil disturbance and vehicle access/movement into occupied sage-grouse habitat. Limit vehicle use to established roads only. 6) Regularly monitor access points and roads for weed establishment.
Ensure that land managers and users (general public) are educated about the threat noxious weeds pose to native plant communities and work together to find appropriate management solutions.	Cooperative integrated weed management efforts are essential in order to have successful sage-grouse habitat.	1) Develop partnerships with regional public and private land management units. Solicit involvement of local weed management specialists, private landowners, wildlife biologists, and range ecologists to share knowledge and responsibilities on noxious weed issues. 2) Establish goals and set priorities that encompass the needs of both livestock and wildlife managers so all parties are working under a similar plan. 3) Provide training to appropriate staff on the proper selection and use of herbicides, including effects that climatic conditions and soils types have on applications of herbicides.

		<p>4) Maintain proper operating herbicide application equipment as well as proper herbicide application records, according to pesticide laws.</p> <p>5) Conduct monitoring and develop follow-up procedures for treated areas.</p> <p>6) Participate in integrated weed management training conducted by state and federal agencies, local experiment stations, and local (county) weed districts.</p> <p>7) Educate all field personnel on weed identification, manner in which weeds spread, and methods of treating weed infestations.</p>
Minimize effects of weed control treatments on non-target organisms.	It is important to maintain viable sagebrush habitat and populations of sage-grouse while eradicating infestations of noxious weeds.	<p>1) Employ integrated weed management treatment methods such as a combination of biological and cultural , e.g., grazing, mowing, or seeding, treatments in conjunction with herbicides to manage weeds in sage-grouse habitat.</p> <p>2) Use the most selective herbicides where chemical treatment is appropriate, to minimize loss of non-target plant species. Develop cost-share guidelines for those instances when expensive selective herbicides are deemed necessary.</p> <p>3) Restore plant communities with desired species adapted to the site, using proven management techniques where biologically feasible. A restoration program may be necessary if conditions prevent natural native plant reestablishment.</p>
Provide necessary funding mechanisms and dedicated labor to act immediately when new infestations are identified within sage-grouse habitat.	New weed infestations are often undetected.	1) Establish a monitoring protocol to detect new infestations.
	Weed management may not be an identified budget item in sage-grouse management plans.	1) Weed management costs should be an identified budget item in sage-grouse management plans. Money should be dedicated for monitoring and education as well as direct treatment expenses.
	Funding and/or human resources may not be available when new infestations are discovered.	1) Establish partnerships or formal agreements with local (county) weed districts if appropriate to utilize their equipment and/or personnel.

## Outreach, Education, and Implementation

Public education, outreach, and “inreach” (communication within agencies and groups to increase understanding) about sage-grouse conservation should be undertaken through a partnership between state and federal agencies, non-governmental organizations, and citizens. Effective conservation of sage-

grouse requires collaboration between public land managers, private landowners, wildlife professionals, extension service agents, and others to develop and implement appropriate regional protection strategies.

Implementation requires a sound biological foundation. Most information about shrub-steppe habitats and sage-grouse is contained in technical manuscripts. User-friendly information is needed to manage habitats to conserve sage-grouse and other sagebrush-associated species. Participating agencies, groups, and individuals will need to develop and provide educational material about sage-grouse and their needs and new research findings as they become available.

<b>How can we inform the public and agencies about sage-grouse populations and habitat needs, and coordinate the implementation of the conservation plan on both public and private lands?</b>		
<b>Goal</b>	<b>Issue</b>	<b>Conservation Action</b>
Improve public and agency understanding about conservation of sage-grouse and sagebrush communities.	The general public and agency staffs have not been exposed to current information on ecological needs and methods for conserving sage-grouse and sagebrush habitats. Materials are needed to present this information.	<ol style="list-style-type: none"> <li>1) Develop educational materials (brochure, Power Point presentation, camera-ready ads, press releases, public service announcements, event invitations and surveys, websites, newsletters, and research information).</li> <li>2) Present materials in a series of community meetings that bring statewide technical group participants and regional agency staff together with local people.</li> </ol>
Gain agency and public understanding, input, and endorsement of the Sage-grouse Conservation Plan	The general public and agency staff may not initially understand, and therefore not support the plan.	<ol style="list-style-type: none"> <li>1) Distribute the plan via hard copy and website.</li> <li>2) Develop and implement a communications plan that identifies the audience and the message.</li> <li>3) Prepare an executive summary of the plan.</li> <li>4) Review and reconcile public concerns.</li> </ol>
Implement a conservation strategy for sage-grouse using the Conservation Plan as a model.	Implementing a rangewide plan in light of diverse geographical, cultural, and socio-economic challenges poses a challenge.	<ol style="list-style-type: none"> <li>1) Implement a local work group. A work group includes but is not limited to agency personnel (BLM, USFS, NRCS, NDG&amp;F, USFWS), landowners, (ranchers, farmers, grazing association), sportsmen, legislators, businessmen, media, etc.</li> </ol>
	Informational materials are needed for the sage-grouse conservation effort.	<ol style="list-style-type: none"> <li>1) Develop a list of incentive programs presently offered that could be used to prevent the loss of sage-grouse habitat.</li> <li>2) Develop and distribute information on best management practices and incentives for sage-grouse and sagebrush obligates.<sup>1</sup></li> </ol>

		<p>3) Request counties and agencies to designate a sage-grouse contact person to interface with county planning authorities.</p> <p>4) Provide sage-grouse habitat maps and recommendations to county planners, public land agencies, and other interest groups and land managers.</p> <p>5) Encourage county governments to offer incentives to developers who protect and enhance sage-grouse habitat.</p>
<p><sup>1</sup> Sagebrush obligates are species that depend on sagebrush during the breeding season or year round: these include sage sparrow, Brewer's sparrow, sage thrasher, sage-grouse, pygmy rabbit, sagebrush vole, sagebrush lizard and pronghorn antelope. Many other species depend on the sagebrush community to a lesser degree. We refer to all these species as sagebrush-associated species (Paige &amp; Ritter 1999)</p>		

## Power Lines and Generation Facilities

Both investor-owned electric utilities and Rural Electric Co-ops deliver electricity through power lines throughout the state. The current density of lines in sage-grouse habitat is lower than in urban or other rural areas due to lower human population density. Increasingly popular rural subdivisions and increasing levels of energy development account for most new power lines in sage-grouse habitat.

Power lines can provide hunting perches for raptors in treeless areas. Sage-grouse also may be injured or killed by flying into these structures. Power lines most likely impact grouse near leks, in brood-rearing habitat, and in wintering areas that also support large numbers of wintering raptors. Construction of new power lines contributes to habitat degradation when accompanied by new roads or other infrastructure, e.g., pipelines, fences, etc.

The U.S. Fish and Wildlife Service strongly encourages electric utilities to address raptor electrocution problems on power lines nationwide by either preventing raptors from perching on poles or by making poles safe for raptors to perch on. Installation of perch prevention devices may protect raptors, but they will still try to land on such poles located near concentrations of prey. Utilities commonly make power poles safe for raptors to use as perches but this poses a dilemma in sage-grouse habitat. It is important that parties involved with power lines utilize appropriate guidelines (Avian Power Line Action Committee guidelines 1994) when designing raptor perch sites and perch guards.

Burying lines would reduce or eliminate both electrocution of raptors and perch sites. Burying high-voltage (Transmission) lines is very difficult both technically and economically. Burying lower voltage (Distribution) lines costs substantially more than equivalent overhead facilities and creates a potential for invasion of noxious weeds. Locating causes of outages on underground lines is difficult and greatly increases the time required for subsequent repair. Underground repairs also involve a greater disturbance of ground and vegetation.

Proposed generation facilities may include fossil fuel plants (coal and natural gas) and wind power. Such facilities also may include associated infrastructure (buildings, roads, railroads, power lines, pipelines etc). When sited in sagebrush habitats, these plants and associated infrastructure may contribute to

destruction, fragmentation, or degradation of sagebrush habitats. Wind turbines may also cause direct mortality to sage-grouse that fly into the rotating blades.

<b>How can we continue to provide electric service to customers and minimize impacts to sage-grouse and sagebrush habitats?</b>		
<b>Goal</b>	<b>Issue</b>	<b>Conservation Actions</b>
Minimize impacts of power lines on sage-grouse and sagebrush habitats.	Existing power lines near a lek, brood-rearing habitat, or winter habitat increases the risk of predation on sage-grouse by raptors.	<ol style="list-style-type: none"> <li>1) Document the segment(s) of line causing problems.</li> <li>2) Determine by cooperative action—agencies, utilities, and landowners—whether or not modification of poles to limit perching will prevent electrocution of raptors and decrease predation on sage-grouse. Inform involved parties of and utilize Avian Power Line Action Committee 1994 guidelines.</li> <li>3) Emphasize the following if perch prevention modifications do not work to protect sage-grouse and sagebrush habitat: <ol style="list-style-type: none"> <li>a) reroute the line using distance, topography, or vegetative cover; or</li> <li>b) bury the line.</li> </ol> </li> <li>4) Explore opportunities for technical assistance and funding.</li> <li>5) Remove power line when use is completed.</li> </ol>
	New power lines proposed in sage-grouse habitat can pose threats to sage-grouse.	<ol style="list-style-type: none"> <li>1) Minimize the number of new lines in sage-grouse habitat.</li> <li>2) Site new lines in existing corridors wherever practicable and site power lines and pipelines along existing roads.</li> <li>3) Encourage use of off-grid systems such as solar, natural gas micro-turbines, and wind power where feasible in sage-grouse habitats.</li> <li>4) If siting power lines on important breeding, brood-rearing, and winter habitat is unavoidable, use the best information available to minimize impacts.</li> <li>5) If siting is required within 2 miles of important breeding, brood-rearing, and winter habitat (Connelly et al. 2000b), emphasize options for preventing raptor perch sites utilizing Avian Power Line Action Committee 1994 guidelines or bury a portion of the line.</li> <li>6) Develop a route—with agencies, utilities, and landowners cooperating—that uses topography, vegetative cover, site distance, etc. to effectively protect identified sage-grouse habitat in a cost efficient manner.</li> </ol>



		<p>7) Restrict timing for construction to prevent disturbance during critical periods:</p> <ul style="list-style-type: none"> <li>a) breeding—1 March-15 June</li> <li>b) winter—1 December-31 March</li> </ul> <p>8) Take appropriate measures to prevent introduction or dispersal of noxious weeds during construction and planned maintenance.</p> <p>9) Remove power line when use is completed.</p>
	Existing power line is causing consistent or significant collision mortality on sage-grouse.	<p>1) Document the segment(s) of line causing consistent or biologically significant mortality—with agencies, utilities, and landowners cooperating in the effort.</p> <p>2) Initiate collision prevention measures using guidelines (Avian Power Line Action Committee 1994) on identified segments. Measures are subject to restriction or modification for wind and ice loading or other engineering concerns, or updated collision prevention information.</p> <p>3) Remove power lines that traverse important sage-grouse habitats when facilities being serviced are no longer in use or when projects are completed.</p>
Minimize impacts of fossil fuel generation facilities on sage-grouse and sagebrush habitats.	Fossil fuel generation may impact sage-grouse and sage-grouse habitat.	<p>1) Use the best available information to:</p> <ul style="list-style-type: none"> <li>a) identify important sage-grouse breeding, brood-rearing, and winter habitat in an appropriate vicinity of a proposed facility and associated infrastructure; and</li> <li>b) site fossil fuel generation facilities and associated infrastructure — with developers, agencies, utilities, and landowners cooperating—using topography, vegetative cover, site distance, etc. to effectively protect identified sage-grouse habitat.</li> </ul> <p>2) Restrict timing of construction to minimize disturbance during critical periods:</p> <ul style="list-style-type: none"> <li>a) breeding—1 March-15 June</li> <li>b) winter—1 December-31 March</li> </ul> <p>3) Take appropriate measures to prevent introduction or dispersal of noxious weeds during construction, maintenance, and operation as required by federal and state laws.</p> <p>4) Develop offsite mitigation strategies in situations where fragmentation or degradation of sage-grouse habitat is unavoidable.</p>

## Predation

Predator populations, their effects on sage-grouse populations, and issues surrounding predator control concern landowners, wildlife managers, and the public. Some people believe that predator populations have increased due to lack of predator control and that predators are the primary factor limiting sage-grouse populations. Others contend that habitat fragmentation and degradation are the primary reasons for population declines, and that these land use changes contribute to increased rates of predation.

Predation does impact sage-grouse to varying degrees. The impact of predation can vary as changes occur in the predator/prey environment seasonally, from year to year, and geographically. Many native mammals, raptors, and other species prey upon sage-grouse eggs, juveniles, and adults. Bull snakes can be an effective nest predator. Invasive species like red fox and raccoon have expanded their range into sagebrush steppe communities and can impact success of ground nesting birds. Quality and quantity of the sagebrush habitat, composition of the predator community, and weather patterns such as drought or severe winters likely determine both annual and long-term carrying capacity for sage-grouse. Sage-grouse populations appear to cycle from low to high numbers under the current combination of habitat, predation, and weather influences.

Certain vital rates such as adult hen survival, nest success, and juvenile recruitment drive sage-grouse population dynamics. Attempting to modify these vital rates to increase populations through either direct predator control actions or by manipulating habitat to indirectly control predation rates should be evaluated in terms of cost effectiveness and efficiency. The influence of weather patterns on these same vital rates should likewise be integrated into these discussions.

How can predation be managed to enhance production and survival of sage-grouse?		
Goal	Issue	Conservation Action
Manage predation to enhance sage-grouse survival and production where appropriate.	Predator numbers and species composition have changed, and the predator-prey relationship for sage-grouse needs further investigation.	<ol style="list-style-type: none"><li>1) Initiate studies to better understand sage-grouse mortality rates, factors that influence these rates, and effectiveness of management actions to change them.</li><li>2) Assess population status and trends of important predator species (both native and invasive).</li><li>3) Expand public information efforts designed to increase public awareness on the role of habitat, predation, and weather on sage-grouse population trends.</li></ol>
	Habitat fragmentation and poor quality habitat may be affecting mortality rates by allowing increased predation.	<ol style="list-style-type: none"><li>1) Initiate studies to determine relationships between predation, habitat fragmentation, and habitat condition.</li><li>2) Implement actions to improve the structure and composition of sagebrush communities to meet desired conditions for sage-grouse seasonal habitats.</li><li>3) Maintain and restore sagebrush communities where appropriate for sage-grouse populations.</li><li>4) Protect existing habitats through conservation easements, incentives, or other practices such as long-term leases.</li></ol>

	Man-caused alterations on the landscape have modified conditions and may directly facilitate increased predation.	<ol style="list-style-type: none"> <li>1) Reduce man-made perches in sage-grouse breeding, nesting, and wintering habitats. <ol style="list-style-type: none"> <li>a) Placement of power poles should follow prescriptions detailed in the discussion of power lines and generation facilities,</li> <li>b) Placement of fences should follow prescriptions detailed in the discussion of grazing management.</li> </ol> </li> <li>2) Reduce the availability of predator "subsidies" such as human-made den sites (nonfunctioning culverts, old foundations, wood piles) and supplemental food sources (garbage dumps, spilled grain, etc.) that contribute to increased predator numbers.</li> <li>3) If predation is shown to be depressing sage-grouse populations, consider predator management actions specific to the predator species, site, and situation.</li> <li>4) Consider expanded opportunities to take non-protected, invasive species where appropriate.</li> </ol>
--	---	---

## Recreational Disturbance of Sage-grouse

Sage-grouse are sensitive to disturbance at leks, nest sites, and in critical winter habitats. Human activity in these habitats may intentionally focus on sage-grouse (lek viewing, monitoring, photography, etc.), or may be incidental to other recreational activities (OHV use, hiking, horseback riding, etc.). Disturbances can be diminished or minimized at critical times and on seasonal ranges by concentrating use at designated times of year or day, restricting activities within 1.5 miles of leks (Joslin and Youmans 1999), and/or allowing certain types of use only at designated sites, e.g. viewing and/or photography at leks.

Monitoring sage-grouse populations and habitats is essential at leks and other critical habitats. Other multiple use activities may disturb leks and other habitats. Recreational and monitoring activities should be considered cumulatively with other activities as part of assessing overall levels, effects, and approaches for managing human disturbance of sage-grouse. Hunting as a recreational activity does not concentrate human use on seasonal ranges.

<b>How can we continue to provide sage-grouse viewing and other recreational opportunities<sup>1</sup> while minimizing impacts to sage-grouse and sagebrush habitats?</b>		
<b>Goal</b>	<b>Issue</b>	<b>Conservation Actions</b>
Minimize impacts of recreational viewing of sage-grouse at leks.	Citizens should be able to view and photograph sage-grouse breeding displays. However, viewing may disturb breeding activities, displace leks, and reduce reproductive success.	<ol style="list-style-type: none"> <li>1) Agencies should document leks where recreational viewing is occurring.</li> <li>2) Working together, the agency(ies) and interested public should determine whether or not management of viewing is needed to reduce disturbance of leks.</li> <li>3) Educational materials should be developed and provided to the public indicating the effects of concentrated recreational activities and the importance of seasonal ranges to sage-grouse.</li> </ol>

	Management of lek viewing may be necessary.	<ol style="list-style-type: none"> <li>1) Establish viewing guidelines, i.e., distance, timing, approach methods, signage, parking areas, and area closures.</li> <li>2) Designate particular leks for public viewing, and where appropriate, restrict viewing and photography to designated sites.</li> <li>3) Determine, through the agency(ies) and the public working together, whether or not other recreational activities disturb leks, nesting, or winter habitats.</li> </ol>
Minimize impacts of recreational activities unrelated to sage-grouse viewing.	Types of recreation other than lek viewing may affect sage-grouse.	<ol style="list-style-type: none"> <li>1) Reduce disturbance of sage-grouse and degradation of sagebrush habitats through use of site-specific monitoring, and where appropriate, develop seasonally restrictive public access to specific lek, nesting, and winter habitats.</li> <li>2) Consider sage-grouse needs when developing roads and OHV management plans.</li> <li>3) Develop and provide educational materials to the public describing effects of concentrated recreational activities and the importance of seasonal ranges to sage-grouse.</li> <li>4) Encourage recreationists to avoid continuous or concentrated use within two miles of leks from 15 March to 15 June.</li> <li>5) Issue special use permits for certain activities with distance and timing restrictions to maintain the integrity of breeding habitat.</li> </ol>

<sup>1</sup> Recreational hunting is discussed elsewhere under separate conservation actions.

## Roads and Motorized Vehicles

Roads have a variety of impacts on sage-grouse and their habitats. Vehicle use on federal and state lands, both on and off roads, has increased significantly over the past few years and is impacting habitat quality (Mattise 1995). As documented in Joslin and Youmans (1999), vehicles do impact wildlife. Severity of impacts may be directly related to the amount of vehicle travel occurring. For example, the impact from an interstate highway through sagebrush-grassland could have a particularly devastating effect on sage-grouse, whereas the impact from small amounts of motorized cross-country travel occurring in the same area could be of little consequence to sage-grouse during non-nesting or other non-critical time periods.

As human population growth continues, pressure to subdivide land may further conflict with sage-grouse. An increase in number of roads will cause continued habitat fragmentation and loss and a potential decline and/or shift in populations. In addition, oil and gas exploration and production will substantially increase the number of roads/2-track trails. Indirect impacts on wildlife and wildlife habitat from road development and use during exploration and production includes trails, 2-track, bladed, and graveled roads. These impacts have been well documented for a variety of development projects (Trombulak and Frissell 2000) and include habitat fragmentation and direct loss of birds due to vehicles,

stress, displacement, and increased hunting pressure. Roads also may affect an animal's reproductive success (Gutzwiller 1991). An increase in roads and other cross-country travel also contributes to the spread of noxious weeds and an overall decrease in wildlife habitat, including sage-grouse habitat.

<b>How can existing and future roads be managed to minimize road-related disturbance, loss of habitat, degradation of habitat, and mortality of sage-grouse?</b>		
<b>Goal</b>	<b>Issue</b>	<b>Conservation Actions</b>
Avoid further fragmentation and/or loss of critical sage-grouse habitats due to road-related disturbances and cumulative effects of roads.	Roads may increase sage-grouse mortality through collisions with vehicles, displacement because of human disturbance, or other factors.	<ol style="list-style-type: none"> <li>1) Identify, map, quantify, and evaluate impacts of existing roads, including 2-tracks, in relation to known lek locations and sage-grouse winter ranges.</li> <li>2) Consider impacts to sage-grouse when designing new roads and modifying existing roads.</li> <li>3) Consider seasonal use restrictions or signing to avoid disturbance of critical sage-grouse habitats.</li> <li>4) Manage on-road travel and OHV use in key grouse areas to avoid disturbance during critical times, e.g., breeding, winter and nesting periods.</li> <li>5) Plan or control organized events to avoid increased traffic and impacts to sage-grouse.</li> <li>6) Manage motorized and mechanized travel to minimize impacts to sage-grouse and their habitat by developing standards for future road construction.</li> <li>7) Manage motorized and mechanized travel to minimize impacts to sage-grouse by increasing enforcement of existing OHV and travel management plans.</li> <li>8) Provide educational opportunities for users of OHVs dealing with possible effects their activities may have on sage-grouse.</li> </ol>
	Roads and their associated disturbances and cumulative effects contribute to the loss of habitat and declining sage-grouse populations.	<ol style="list-style-type: none"> <li>1) Develop a transportation management plan across ownership boundaries in critical sage-grouse habitats.</li> <li>2) Participate in travel planning efforts and educate the general public about the impacts of roads on sage-grouse and critical habitats.</li> <li>3) Consider buffers, removal, realignment, or seasonal closures where appropriate to avoid degradation of habitat.</li> <li>4) Re-vegetate closed roads with plant species beneficial to sage-grouse.</li> <li>5) Close and re-vegetate travel ways in sage-grouse habitats where appropriate.</li> </ol>

		6) Provide sage-grouse habitat information to all entities during planning phases of transportation development.
--	--	--

## Vegetation

Sage-grouse require large expanses of sagebrush habitats with healthy, diverse understories of grasses and forbs. In some areas, past management of rangelands has altered the density, structure, and composition of sagebrush communities—sometimes creating a variety of conditions that do not meet the desired condition described for sage-grouse seasonal needs. Composition of grasses and forbs, condition and densities of sagebrush, and other habitat-related conditions vary and include extremes. Variation may result from environmental factors such as climate or land management practices as fire management, grazing, weeds, and recreation. Restoring or enhancing sage-grouse habitats requires diverse strategies. Disagreement among professionals often arises regarding the ecological role, or successional relationships, of “mature” or “decadent” stands of sagebrush, the need to manipulate sagebrush communities, method of control, and extent of treatment. Prior to sagebrush manipulation on public land, a thorough review by an interdisciplinary team should be conducted. To determine potential effects, the review should include an analysis of historic treatments on similar habitat nearest the area in question.

Sage-grouse habitats face the risk of sagebrush removal by prescribed burning, herbicide application, or by conversion to cropland. Conserving sagebrush habitats on private and public lands is by far the most effective approach to assuring long-term maintenance of sage-grouse abundance and distribution. Incentive-based, voluntary programs are available for protecting privately-owned sage-grouse habitats from detrimental habitat conversion. In some areas, there are opportunities for planting cropland back to sagebrush-grassland habitat but such sagebrush plantings are costly and can have a high failure rate.

<b>How can we manage the density, structure, and composition of shrubs, forbs, and grasses to maintain the health of the community, enhance sage-grouse habitats, and meet the needs of other species and human uses?</b>		
<b>Goal</b>	<b>Issue</b>	<b>Conservation actions</b>
Manage sagebrush communities in a manner that results in improved health and no net loss of sagebrush habitats.	Key privately owned sagebrush-grassland habitats may be at risk of manipulation.	1) Provide incentives for habitat conservation such as the state-administered Landowner Incentive Program, which provides an incentive payment to private landowners for protecting sagebrush habitats from plowing, herbicides, and burning (see Section V).  2) Promote sagebrush-grassland habitat conservation through USDA programs.  3) Protect habitat by purchase of conservation easements from interested landowners.
	Information regarding sagebrush distribution is incomplete.	1) Map and inventory existing sagebrush.  2) Improve the classification of sagebrush cover to distinguish density and species.
Provide for a density, composition, and diversity of sagebrush that meet seasonal needs of sage-grouse while	The age distribution of sagebrush may have been altered by management, e.g., a young stand recovering	1) Map and inventory areas.  2) Evaluate the site potential and desired condition, and develop specific objectives accordingly within specific landscapes.

contributing to overall community health.	from disturbance or a mature stand with poor regeneration.	<p>3) If sagebrush is lacking:</p> <ul style="list-style-type: none"> <li>a) develop and implement grazing practices that support sagebrush establishment and growth,</li> <li>b) inter-seed historical breeding and winter habitats with the appropriate sagebrush species,</li> <li>c) identify and promote seed sources for habitat restoration efforts,</li> <li>d) encourage voluntary use of sagebrush in habitat incentive programs, e.g., Conservation Reserve Program, and work to develop additional funding sources for such programs,</li> <li>e) reclaim and/or re-seed areas where sagebrush has been lost or reduced by disturbance (fire, cropping, etc.),</li> <li>f) promote sagebrush plantings on project areas occurring within sage-grouse habitats.</li> </ul> <p>4) If mature sagebrush dominates (based on sagebrush age sampling) with suppressed herbaceous understory:</p> <ul style="list-style-type: none"> <li>a) identify areas of dense mature cover that do not appear to be serving as quality habitat and analyze these areas within the context of a larger landscape,</li> <li>b) determine the reason for suppressed herbaceous understory (e.g., soil condition, historical grazing management, drought) and identify/implement methods for improving understory health (e.g. applying prescriptive grazing treatments, see Livestock Grazing Management),</li> <li>c) design sagebrush treatments to be compatible with sage-grouse needs,</li> <li>d) develop specific objectives for sage-grouse in breeding or winter habitats.</li> </ul>
Within the context of improving seasonal habitats, maintain or improve vegetative quality and quantity of the understory in all breeding habitats of sage-grouse.	The plant community has been altered and lacks a diverse herbaceous understory.	<ul style="list-style-type: none"> <li>1) Map and inventory areas believed to be important sage-grouse breeding habitats.</li> <li>2) Evaluate the site potential and desired condition within the context of a larger landscape.</li> <li>3) Develop and implement techniques to increase herbaceous diversity and density within ecological limits.</li> <li>4) Ensure that grazing practices allow plants to grow to seed ripe on a rotational basis.</li> <li>5) Adjust livestock grazing management when necessary to promote forb establishment and recruitment.</li> <li>6) Identify large areas of introduced plant species as crested wheatgrass (<i>Agropyron cristatum</i>) and determine if restoration efforts are appropriate.</li> </ul>

		<p>7) Interseed appropriate breeding habitats with forbs where necessary.</p> <p>8) If mature sagebrush dominates with suppressed herbaceous understory:</p> <ol style="list-style-type: none"> <li>identify areas of dense mature cover that do not appear to be serving as quality habitat and analyze these areas within the context of a larger landscape,</li> <li>design sagebrush treatments to be compatible with sage-grouse needs,</li> <li>develop specific objectives for sage-grouse in breeding or winter habitats,</li> <li>if treatment is deemed appropriate, interrupt seral stages within the appropriate patch size using a method (brush beating, chaining, chemical means, prescribed fire) compatible with local conditions.</li> </ol> <p>9) Identify and promote seed sources for habitat restoration efforts.</p> <p>10) Identify landowner incentives and additional funding sources to enhance existing programs (as CRP).</p> <p>11) Protect/enhance riparian areas to encourage succulent vegetation and re-establishment of shrubs if they are lacking.</p>
	Residual understory is lacking in sagebrush stands, mainly in breeding habitats.	<p>1) Develop incentives to promote desired habitat conditions on private lands.</p> <p>2) Manage grazing by domestic livestock and wild herbivores to retain and promote adequate residual cover in all breeding habitats with an emphasis on nesting areas.</p> <p>3) Ensure that grazing allotment plans include objectives for sage-grouse in sage-grouse habitats.</p> <p>4) Monitor USFS/BLM/State allotment plans and regulations, and promote changes where necessary.</p> <p>5) Include native grasses in all reclamation and restoration activities.</p>
Where opportunities allow, restore sage-grouse habitats lost to plowing.	Sagebrush-grassland habitats, important to sage-grouse, have been converted to cropland.	<p>1) Work with landowners to re-establish sagebrush-grassland habitats through programs such as the Habitat Plots Program or CRP.</p>
Where opportunities allow, acquire land in the sage grouse range.	Land may become available for acquisition, both from other public agencies or from the private sector.	<p>1) Assume ownership and management of land now managed by the State Land Department (some of these lands are not profitable to the state).</p> <p>2) Acquire private land tracts offered for sale by landowners.</p> <p>3) Support acquisition by other public agencies (BLM, USFS) in their efforts to acquire land by purchase.</p>



		4) Support land trades by BLM and USFS where trades are beneficial to sage grouse.
--	--	--

## Managing Other Wildlife in Sage-grouse Habitats

Wild ungulates and other native herbivores, e.g., prairie dogs, may negatively affect habitats upon which grouse depend. Wild herbivores can contribute to the reduction of shrub canopy and/or herbaceous understory in nesting and brood-rearing habitats. Wild ungulates most often affect habitats of limited size within a landscape that includes streamsides and wet meadows that under most conditions provide an abundance of forbs and insects needed by sage-grouse broods. These areas become increasingly important as dry conditions typically progress through summer.

Other land uses can compound the effects on areas of concentration by wild ungulates and other native herbivores. These conditions are especially important to address during periods of drought. Any attempt to resolve potential conflicts from wildlife use in sage-grouse habitats depends on the knowledge and cooperation of local landowners and resource managers. Where evidence of adverse impacts by wild ungulates or other native herbivores is available, obtaining quantitative, site-specific measurements of vegetation conditions is paramount to assure that assessments are objective, and causes are accurately determined.

<b>How can sage-grouse habitat be maintained where the effects of other wild herbivores (ungulates) are reducing the quality of the site for use by sage-grouse?</b>		
<b>Goal</b>	<b>Issue</b>	<b>Conservation Action</b>
Manage for wild herbivore populations commensurate with the capability of sagebrush communities to sustain sage-grouse, other sagebrush dependent species, and other land use objectives.	High concentrations of wild herbivores in localized areas may reduce habitat effectiveness for sage-grouse.	<ol style="list-style-type: none"> <li>1) Identify and map key sage-grouse habitats where other wild herbivores are having significant impacts.</li> <li>2) Establish an inventory and vegetative monitoring schedule to quantitatively determine the extent of the effects in key areas.</li> <li>3) Determine seasons of expected use and assess the potential impact to sage-grouse habitat.</li> <li>4) Develop plans that keep ungulate population levels consistent with a site's capability to support them.</li> </ol>
Provide for an adequate amount of functioning riparian <sup>1</sup> habitat during critical periods such as brood rearing.	Riparian habitats may be vulnerable to overuse by wild herbivores on some sites. This can sometimes be exacerbated seasonally, during droughts, and/or by other land use practices.	<ol style="list-style-type: none"> <li>1) Identify levels of use by wild herbivores in affected riparian areas.</li> <li>2) Identify other land use practices occurring in riparian habitats.</li> <li>3) Assess current management practices in respect to findings.</li> <li>4) Determine whether management changes are needed.</li> <li>5) Have drought management plans in place to allow for the rapid implementation of alternate management strategies.</li> </ol>

<sup>1</sup> Riparian habitat includes shoreline and drainages leading to small impoundments.

## Literature Cited:

- Avian Power Line Interaction Committee (APLIC). 1994. Mitigating bird collisions with power lines: the state of the art in 1994. Edison Electric Institute, Washington, DC. 78 pp.
- Connelly, J. W., K. P. Reese, Richard A. Fischer, and W. L. Wakkinen. 2000a. Response of a sage-grouse breeding population to fire in southeastern Idaho. *Wildlife Society Bulletin* 28(1):90-96.
- \_\_\_\_\_, M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000b. Guidelines to manage sage-grouse populations and their habitats. *Wildlife Society Bulletin* 28(4):967-985.
- Gutzwiller, K. J. 1991. Assessing recreational impacts on wildlife: the value and design of experiments. *Transactions of the North American Wildlife and Natural Resources Conference* 56:248-255.
- Hormay, A. C. 1970. Principles of rest-rotation grazing and multiple-use land management. Training text-4. USDA Forest Service. 25 pp.
- Joslin, G., and H. Youmans, comps. 1999. Effects of recreation on Rocky Mountain wildlife: a review for Montana. Committee on Effects of Recreation on Wildlife, Montana Chapter of the Wildlife Society. 307 pp.
- Mattise, S. N. 1995. Sage-grouse in Idaho: Forum '94. Idaho Bureau of Land Management Technical Bulletin No. 95-15.
- Messmer, T. A., M. W. Brunson, D. Reiter, and D. G. Hewitt. 1999. United States public attitudes regarding predators and their management to enhance avian recruitment. *Wildlife Society Bulletin* 27(1):75-85.
- Montana Department of Natural Resources and Conservation (DNRC). 1999. Best management practices for grazing. Helena. 29 pp.
- Montana Fish, Wildlife and Parks. 1994. Draft environmental assessment and noxious weed plan. Region 3, Bozeman. 69 pp.
- North Dakota State University Extension Service. 2004. 2004 North Dakota Weed Control Guide. Circular W-253. North Dakota State University, Fargo, 131 pp.
- Nelson, H. K. 2001. Impact to predation on avian recruitment – An Introduction. *Wildlife Society Bulletin* 29(1):2-5.
- Paige, C., and S.A. Ritter. 1999. Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Partners in Western Flight working Group, Boise, ID.
- Rice L. A. and A. V. Carter. 1982. Evaluation of South Dakota Management Practices as they affect prairie chicken populations, 1974-78. Pittman-Robertson Project W-75-R(16-21), Study PC-7.1(7509). 25 pp.
- Schroeder, M.A., and R. K. Baydack. 2001. Predation and the management of prairie grouse. *Wildlife Society Bulletin* 29(1):34-32.

Trombulak, S. C., and C. A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. *Conservation Biology* 14:18-30.

Wald, E.J. 2003. The potential for dispersal of leafy spurge and other seeds in wildlife fecal deposits. Master of Science Thesis, South Dakota State University, Brookings. 123 pp + appendices